REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Remove vendor CAGE 13919. Add device type 02. Add vendors CAGE 31757 and 60024. Change to reflect MIL-H-38534 processing. Editorial changes throughout.	91-09-13	Tim H. Noh

REV																				
SHEET																				
REV																				
SHEET																				

REV STATUS OF SHEETS															
REV	A	A	A	A	A	A	A	A	A	A	A	A		
SHEET	1	2	3	4	5	6	7	8	9	10	11	12		

PMIC N/A

STANDARDIZED MILITARY DRAWING

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

PREPARED BY: Gary Zahn

CHECKED BY: Steve Duncan

APPROVED BY: Tim H. Noh

DRAWING APPROVAL DATE: 87-09-16

REVISION LEVEL: A

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUITS, LINEAR, HIGH POWER OPERATIONAL AMPLIFIER, HYBRID

SIZE	CAGE CODE	5962-87620
A	67268	

SHEET 1 OF 12

DESC FORM 193

Use previous edition until exhausted.

JUL 91

5962-E010

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing describes device requirements for class H hybrid microcircuits to be processed in accordance with MIL-H-38534.

1.2 Part or Identifying Number (PIN). The complete PIN shall be as shown in the following example:

5962-87620	01	X	X
Drawing number	Device type (see 1.2.1)	Case outline (see 1.2.2)	Lead finish per MIL-H-38534

1.2.1 Device type(s). The device type(s) shall identify the circuit function as follows:

Device type	Generic number	Circuit function
01	42106	High power operational amplifier
02	PA51	High power operational amplifier

1.2.2 Case outline(s). The case outline(s) shall be as designated in appendix C of MIL-M-38510, and follows:

Outline letter	Case outline
X	See figure 1, (8-lead, 1.550" x .340"), can package
Y	See figure 1, (8-lead, 1.550" x .250"), can package

1.3 Absolute maximum ratings.

Supply voltage range	±40 V dc
Differential input voltage	$\pm V_{CC}$-3 V
Common mode input voltage	$\pm V_{CC}$
Storage temperature range	-65°C to +150°C
Maximum power dissipation (P_D):	
Device type 01	80 W 1/
Device type 02	97 W 2/
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (θ_{JC}):	
Device type 01	2.2°C/W
Device type 02	1.8°C/W
Junction temperature (T_J)	+200°C

1.4 Recommended operating conditions.

Supply voltage ($\pm V_{CC}$)	±34 V dc
Operating temperature range:	
Device type 01, (T_A)	-55°C to +125°C
Device type 02, (T_C)	-55°C to +125°C

1/ At ambient temperature of +25°C, derate at 2.2°C/W above ambient temperature of +25°C.
2/ At case temperature of +25°C, derate at 1.8°C/W above case temperature of +25°C.

2. APPLICABLE DOCUMENTS

2.1 Government specifications and standard. Unless otherwise specified, the following specifications and standard of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.
MIL-H-38534 - Hybrid Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specifications and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with MIL-H-38534 and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-H-38534 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein and figure 1.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

3.3 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I and apply over the full (ambient for device 01), (case for device 02) operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are as described in table I.

3.5 Marking. Marking shall be in accordance with MIL-H-38534. The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in QML-38534 (see 6.6 herein).

TABLE I. Electrical performance characteristics. (Device type 01)

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Input offset voltage	V_{IO}	$\pm V_{CC} = \pm 34$ V	1	-5	+5	mV
Input offset voltage drift	DV_{IO}	$\pm V_{CC} = \pm 34$ V	2, 3	-40	+40	µV/°C
Input bias current	I_{IB}	$\pm V_{CC} = \pm 34$ V	1	-20	+20	nA
			2, 3	-35	+35	
Input offset current	I_{IO}	$\pm V_{CC} = \pm 34$ V	1	-3	+3	nA
			2, 3	-7	+7	
Power supply rejection ratio	+PSRR	$-V_{CC} = -34$ V dc; $+V_{CC} = +10$ to $+40$ V dc	1	-100	+100	µV/V
			2, 3	-200	+200	
	-PSRR	$+V_{CC} = +34$ V dc; $-V_{CC} = -10$ to -40 V dc	1	-100	+100	
			2, 3	-200	+200	
Common mode rejection ratio	CMRR	$V_{CM} = \pm 22$ V; f = dc	1	80		dB
			2, 3	76		
Supply current	I_{CC}	$V_{CM} = 0$ V, no load condition	1, 2, 3	-10	+10	mA
Output voltage peak	V_{OP}	$I_O = 10$ A peak	4	-26	+26	V
		$R_L = 10$ kΩ	5, 6	-30	+30	
Output current peak	I_{OP}	$R_L = 2.6Ω$	4	-10	+10	A
Voltage gain	A_{VS}	$R_L = 10$ kΩ	4, 5, 6	94		dB
Slew rate	SR	$R_L = 6.5Ω$	4	1.35		V/µs

TABLE I. Electrical performance characteristics - Continued. (Device type 02)

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$, $\pm V_{CC} = \pm 34$ V dc unless otherwise specified	Group A subgroups	Limits Min	Limits Max	Unit
Supply current	I_S	V_{IN} = 0 V dc, G = 100, $\pm R_{CL}$ = 0.1Ω, V_{CM} = 0 V dc 2/	1, 3 2		10 13	mA
Input offset voltage	V_{OS}	V_{IN} = 0 V dc, G = 100, $\pm V_{CC}$ = ±10 V dc, $\pm R_{CL}$ = 0.1Ω 2/	1 2 3	-16.0 -22.5 -21.2	+16.0 +22.5 +21.2	mV
		V_{IN} = 0 V dc, G = 100, $\pm V_{CC}$ = ±34 V dc, $\pm R_{CL}$ = 0.1Ω 2/	1 2 3	-10.0 -16.5 -15.2	+10.0 +16.5 +15.2	mV
		V_{IN} = 0 V dc, G = 100, $\pm V_{CC}$ = ±40 V dc, $\pm R_{CL}$ = 0.1Ω 2/	1 2 3	-11.2 -17.7 -16.4	+11.2 +17.7 +16.4	mV
Input bias current, +IN	$+I_S$	V_{IN} = 0 V dc, $R_{BIAS} \le 100$ MΩ	1 2, 3		40.0 80.0	nA
Input bias current, -IN	$-I_S$	V_{IN} = 0 V dc, $R_{BIAS} \le 100$ MΩ	1 2, 3		40.0 80.0	nA
Input offset current -IN	I_{OS}	V_{IN} = 0 V dc, $R_{BIAS} \le 100$ MΩ	1 2, 3		10.0 30.0	nA
Output voltage	V_O	$\pm V_{CC}$ = ±40 V dc, I_o = 68 mA, $R_L \ge 500Ω$	4, 5, 6	34		V
		$\pm V_{CC}$ = ±34 V dc, I_o = 4 A, $R_L \ge 6Ω$	4, 5, 6	24		V
		$\pm V_{CC}$ = ±18 V dc, I_o = 10 A, $R_L \ge 1Ω$	4, 6	10		V
		$\pm V_{CC}$ = ±16 V dc, I_o = 8 A, $R_L \ge 1Ω$	5	8		V

See footnotes at end of table.

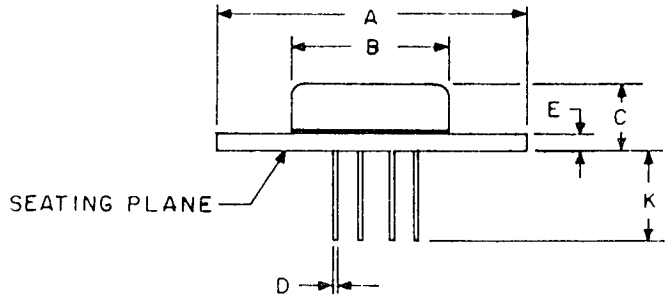
TABLE I. Electrical performance characteristics - Continued. (Device type 02)

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ $\pm V_{CC} = \pm 34$ V dc unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Current limits	I_{CL}	$R_L = 1\Omega$, $\pm R_{CL} = 0.1\Omega$ 2/ $\pm V_{CC} = 16$ V dc	4	5.0	7.9	A
Stability/noise	E_N	G = 1, $\pm V_{CC} = 34$ V dc, $C_L = 1.5$ nF	4, 5, 6		1.0	mV
Slew rate	S_R	$R_L = 500\Omega$, $\pm V_{CC} = \pm 34$ V dc, $V_{IN} \ge 4$ Vp-p	4, 5, 6	1.0	10	V/μs
Open loop gain	A_{OL}	$R_L = 500\Omega$, $\pm V_{CC} = \pm 34$ V dc, f = 15 Hz, $V_{IN} \ge .4$ Vp-p	4, 5, 6	91		dB
Common mode rejection	CMR	$\pm V_{CC} = \pm 15$ V dc, + f = dc, $V_{CM} = \pm 9$ V dc	4, 5, 6	70		dB

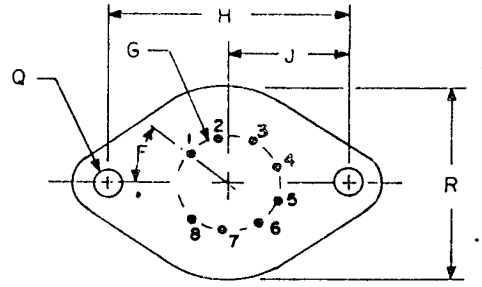
1/ During all group A testing terminal connection F.O. (pin 7) is left open.
2/ A current limiting resistor (R_{CL}) is connected between C_L+ to the output and C_L- to the output during these tests.

Device type 01

Case outline X



NOTE: Leads in true position within .010 inch (0.25 mm) R at MMC at seating plane.



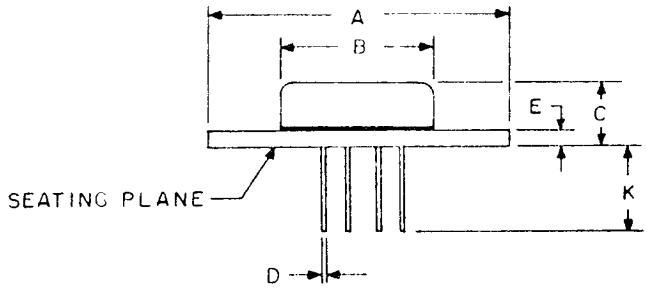
(BOTTOM VIEW)

Dim	Inches		Millimeters	
	Min	Max	Min	Max
A	1.510	1.550	38.35	39.37
B	.745	.770	18.92	19.56
C	.260	.340	6.60	8.64
D	.038	.042	0.97	1.07
E	.080	.105	2.03	2.67
F	40° Basic		40° Basic	
G	.500 Basic		12.7 Basic	
H	1.186 Basic		30.12 Basic	
J	.593 Basic		15.06 Basic	
K	.400	.500	10.16	12.70
Q	.151	.161	3.84	4.09
R	.980	1.020	24.89	25.91

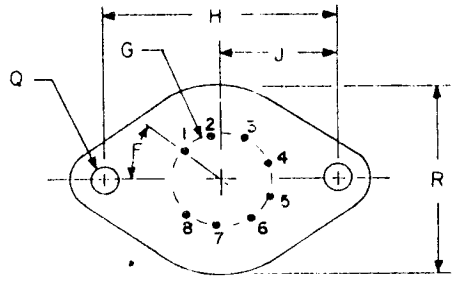
FIGURE 1. Case outlines.

Device type 02

Case outline Y



NOTE: Leads in true position within .010 inch (0.25 mm) R at MMC at seating plane.



(BOTTOM VIEW)

Dim	Inches		Millimeters	
	Min	Max	Min	Max
A	1.510	1.550	38.35	39.37
B	.745	.770	18.92	19.56
C	.225	.250	5.71	6.35
D	.038	.042	0.97	1.07
E	.080	.105	2.03	2.67
F	40° Basic		40° Basic	
G	.500 Basic		12.7 Basic	
H	1.186 Basic		30.12 Basic	
J	.593 Basic		15.06 Basic	
K	.400	.500	10.16	12.70
Q	.151	.161	3.84	4.09
R	.980	1.020	24.89	25.91

FIGURE 1. Case outlines - Continued.

Device types	01 and 02
Case outlines	X and Y
Terminal number	Terminal symbol
1	Output
2	+Current limit (C_L+)
3	+V_{CC}
4	+IN
5	-IN
6	-V_{CC}
7	No connection
8	-Current limit (C_L-)

FIGURE 2. Terminal connections.

3.6 Manufacturer eligibility. In addition to the general requirements of MIL-H-38534, the manufacturer of the part described herein shall submit for DESC-ECC review and approval electrical test data (variables format) on 22 devices from the initial quality conformance inspection group A lot sample, produced on the certified line, for each device type listed herein. The data should also include a summary for all parameters manually tested, and for those which, if any, are guaranteed.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in QML-38534 (see 6.6 herein). The certificate of compliance submitted to DESC-ECC prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-H-38534 and the requirements herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-H-38534 shall be provided with each lot of microcircuits delivered to this drawing.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-H-38534.

4.2 Screening. Screening shall be in accordance with MIL-H-38534. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition B or D using the circuit submitted with the certificate of compliance (see 3.7 herein).

(2) T_A = +125°C minimum for device type 01 and T_C = +125°C minimum for device type 02.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

c. Constant acceleration may be performed after burn-in, upon approval of the qualifying activity.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-H-38534 and as specified herein.

4.3.1 Group A inspection. Group A inspection shall be in accordance with MIL-H-38534 and as follows:

a. Tests shall be as specified in table II herein.

b. V_{OP} and I_{OP} for group A electrical test subgroup 4 may be omitted.

c. Subgroups 7, 8, 9, 10, and 11 in table X, method 5008 of MIL-STD-883 shall be omitted.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5008, group A test table)
Interim electrical parameters	1
Final electrical test parameters	1*, 2, 3, 4, 5, 6,
Group A test requirements	1, 2, 3, 4**, 5, 6
Groups C end-point electrical parameters	1

* PDA applies to subgroup 1.
** See 4.3.1b.

4.3.2 Group B inspection. Group B inspection shall be in accordance with MIL-H-38534.

4.3.3 Group C inspections. Group C inspection shall be in accordance with MIL-H-38534 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test conditions, method 1005 of MIL-STD-883.

(1) Test condition B or D using the circuit submitted with the certificate of compliance (see 3.7 herein).

(2) T_A = +125°C minimum for device type 01 and T_C = +125°C minimum for device type 02.

(3) Test duration: 1,000 hours, except as permitted method 1005 of MIL-STD-883.

4.3.4 Group D inspection. Group D inspection shall be in accordance with MIL-H-38534.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-H-38534.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for original equipment design applications and logistic support of existing equipment.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-481 using DD Form 1693, Engineering Change Proposal (Short Form).

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronics devices (FSC 5962) should contact DESC-ECC, telephone (513) 296-8527.

6.5 Comments. Comments on this drawing should be directed to DESC-ECC, Dayton, Ohio 45444, or telephone (513)-296-8525.

6.6 Approved sources of supply. Approved sources of supply are listed in QML-38534. Additional sources will be added to QML-38534 as they become available. The vendors listed in QML-38534 have agreed to this drawing and a certificate of compliance (see 3.7 herein) has been submitted to and accepted by DESC-ECC.